

FOREST PEST CONDITIONS IN CALIFORNIA - 1993



A Publication of the California Forest Pest Council

THE CALIFORNIA FOREST PEST COUNCIL

The California Forest Pest Council (formerly the California Forest Pest Control Action Council) was established in 1951. Membership is open to public and private forest managers, foresters, silviculturists, entomologists, pathologists, zoologists, and others interested in the protection of forests from damage caused by animals, disease, insects, and weeds. The Council's objective is to establish, maintain, and improve communication among individuals -- managers, administrators, and researchers -- who are concerned with these issues. This objective is accomplished by four actions:

1. Coordination of detection, reporting, and compilation of pest damage information.
2. Evaluation of pest conditions.
3. Pest control recommendations made to forest management agencies and landowners.
4. Review of policy, legal, and research aspects of forest pest control, and submission of recommendations thereon to appropriate authorities.

The California Board of Forestry recognizes the Council as an advisory body in forest pest protection. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

This report, **FOREST PEST CONDITIONS IN CALIFORNIA - 1993**, is compiled for public and private forest land managers to keep them informed of pest conditions on forested land in California, and as an historical record of pest trends and occurrences. The report is based largely on information provided by four sources: (1) the state-wide Cooperative Pest Survey, in which federal, state, and private foresters and land managers participate, (2) information generated by Forest Pest Management, Pacific Southwest Region, USDA-Forest Service, while making formal detection surveys and biological evaluations, (3) reports and surveys of conditions on private lands provided by personnel of the California Department of Forestry and Fire Protection, and (4) surveys and detections of the California Department of Food and Agriculture.

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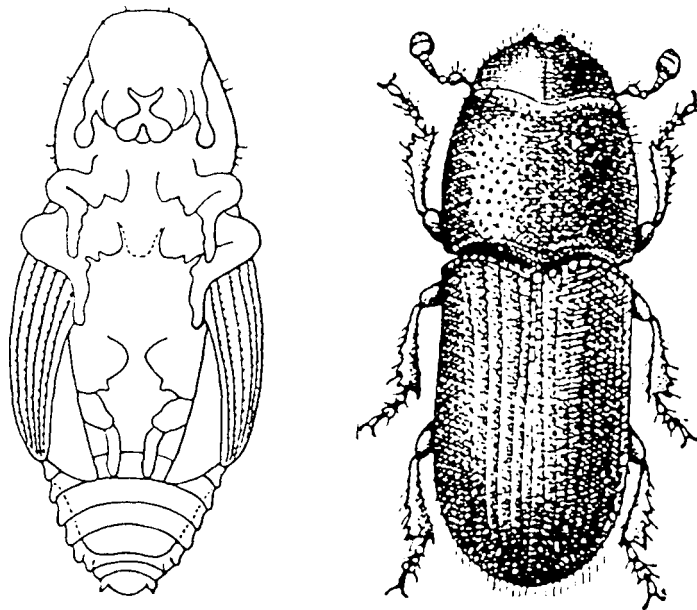
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STATUS AND CONTROL OF INSECTS

A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL FROM THE INSECT COMMITTEE



JOHN DALE, CHAIR
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STATUS AND CONTROL OF INSECTS

WESTERN PINE BEETLE, *Dendroctonus brevicomis*

North Coast. Over 200 ponderosa pines were attacked at the Boggs Mountain Demonstration State Forest in Lake County. Most of these pines also came under attack by red turpentine beetles and flatheaded borers. The western pine beetle also killed several fire scorched pines near Covelo (Mendocino County) and scattered ponderosa and Coulter pines in Santa Clara County.

Northern. Although late rains and a cool spring kept many infested trees green through the end of June, ponderosa pine mortality caused by drought and western pine beetle was evident during the spring of 1993. These were trees which were attacked late in 1992 by the western pine beetle. Although scattered, ponderosa pine mortality was higher than normal on McCloud Flats, Siskiyou County. Concentrations of ponderosa pine mortality were located at Atchison Campground, Glenn County, Mill Valley Campground, Colusa County, and Hayfork Valley, Trinity County. Siskiyou County locations include the Interstate 5 corridor south of Yreka, the Klamath River canyon from Craggy Mountain downstream to Happy Camp, the Elk Creek drainage, numerous locations surrounding Cecilville, Bolivar Lookout, near Copco Lake, west of Meiss Lake, around Red Rock Valley, near Blue Canyon, scattered near Pondosa, and old growth ponderosa pine in the Hornbrook Cemetery. Western pine beetle also was involved in mortality of larger diameter ponderosa pines on the Hat Creek and Eagle Lake Ranger Districts of the Lassen National Forest along Highway 44.

Ponderosa pine mortality increased from Burney east through the Fall River Valley, Shasta County. Several hundred acres of ponderosa on a bench south of the Pit River (Sec. 16, T36N, R4E) were severely affected, with mortality approaching 80% in the center of the area. Although mortality has been occurring here over the past few years, most of the trees were killed in 1992. Currently infested trees are present around the periphery of the area.

Sierra. Pine mortality related to the western pine beetle/drought complex has declined from the levels of the past two-to-three years throughout the westside pine and mixed conifer types in the Southern Sierra Nevada. This appears to be a result of increased host resistance

related to abundant precipitation last winter. Continued mortality was noted in isolated, scattered, small group kills in the lower to mid-elevation pine and mixed conifer types on the Calaveras Ranger District, Stanislaus National Forest, and on the Tule River Ranger District, Sequoia National Forest. During May of this year many of the fire-damaged pines in the Deer Creek area, Miwok Ranger District, Stanislaus National Forest were heavily attacked by western pine beetle.

Losses from the western pine beetle in the Sierra are incorporated within the figures for "pine" in Table 1.

TABLE 1. Mortality from Bark Beetles within the National Forest System, California - 1993 ^a

Locale	True Fir		Pine ^b	
	Acres of Mortality	MMBF	Acres of Mortality	MMBF
Northern California	84,000	278.1	96,510	290.5
Cascade/ So. Sierra	34,300	172.1	179,950	181.6
Central/ So. Sierra	163,600	305.5	111,950	171.1
Southern California	62,800	64.2	16,590	11.7
Total ^c	345,500	819.9	405,000	654.9

a. Mortality is seldom from bark beetles alone as other factors (eg. drought) and agents (eg. diseases) predispose trees to successful attack.

b. Includes ponderosa, Jeffrey, sugar and lodgepole pines.

c. Includes Douglas-fir in the total.

PINE ENGRAVER BEETLES, *Ips* spp.

North Coast. The California fivespined engraver, *Ips paraconfusus*, attacked a few scattered ponderosa pines in the Boggs Mountain Demonstration State Forest (Lake County) and near Covelo (Mendocino County).

Northern. Very little mortality could be attributed to pine engravers this year. Winter storms caused a great deal of breakage, but no mortality resulted. Ample win-

ter precipitation may have reduced tree susceptibility to attack.

Sierra. During the spring and early summer, green broken tops and blowdown from winter storms were infested with pine engravers at various locations from the Middle Fork of the Yuba River southward through the Sierra Nevada Range. Subsequent top-kill to standing pines was not reported.

FIR ENGRAVER, *Scolytus ventralis*.

North Coast. This beetle successfully attacked a limited number (23) of grand fir at the Jackson Demonstration State Forest, Mendocino County. Ten of the trees were infected with *Armillaria* root disease and eight others were infected with *Annosus* root disease.

Northern. Large numbers of white fir trees were attacked by the fir engraver during July, August and September of 1992. Most of these trees faded during the spring of 1993. The areas with the highest levels of white fir mortality appeared to be ones that normally receive relatively low precipitation. West of Interstate 5, the areas with the heaviest white fir mortality tended to be around the west and north sides of the Scott Valley. East of Interstate 5, there were many spots of moderate-to-high white fir mortality scattered throughout the southern end of the Cascade Range. Specific locations on the Goosenest Ranger District, Siskiyou County include: Flat Springs Canyon, Hells Canyon, Cold Creek, Eagle Rock, Black Rock, McGavin Peak, Ikes Mountain (Mtn), Butte Mtn, Shovel Creek Meadow, Willow Creek Mtn, Juanita Lake, Bear Wallow, Panther Rock, Martin Dairy, Smith Spring, Goosenest Mtn, Miller Mtn, Hebron Mtn, Wild Horse Mtn, Deer Mtn, The Whaleback, Blue Canyon, West Haight Mtn, Pomeroy Creek, Antelope Creek, south of Stevens Pass, north of Little Horse Peak, Grouse Hill, and north of Pumice Stone Mountain. Moderate-to-heavy white fir mortality occurred on approximately 16,000 contiguous acres around Hambone Butte on the McCloud District, Siskiyou County.

A dramatic increase in tree mortality occurred among white fir in Modoc County. In previous years, moderate to high levels of fir mortality have been noted in the Big Valley Mountains and west of Goose Lake. This spring, high levels of fir mortality were visible from many locations along Highway 299. Specific locations include Higgins Flat, Grouse Mountain, Adin Pass, Hunters Ridge, and Manzanita Mountain. Stands of white fir in the north Warner Mountains which have high levels of mortality are visible from Highway 395 between Joseph Creek and Davis Creek. A high percentage of the white

fir located west of Goose Lake, in areas such as Crowder Flat, have been recently killed. Two plots in the Cal-Pines subdivision had approximately 30% of live trees killed in 1992, while 2 plots west of Goose Lake had 50% mortality. Levels of mortality are even higher if the impact of the entire drought is considered.

Levels of white fir mortality from 50 to 80 percent of the stand were visible from Highway 44 on many of the peaks in the western half of Lassen County such as Roop Mountain, Round Valley Butte, Bogard Buttes, Pegleg Mountain, and Poison Butte. There was also heavy white fir mortality at Fredonyer Pass, Fredonyer Butte, and Little Fredonyer near Highway 36. White fir mortality was heavy in isolated fir stands on lands managed by the Bureau of Land Management, such as Fredonyer Peak, east of Eagle Lake. Some of these isolated fir stands had a high percentage of trees with old top-kills from a previous Douglas-fir tussock moth outbreak.

Because most true firs killed in 1993 have not yet faded, it is unknown how severe true fir mortality will be in 1994. However, an inspection of white fir in the vicinities of Pondosa and Harris Mountain, Siskiyou County, showed a decreasing trend in mortality. Many trees attacked by the fir engraver this year had successfully resisted the beetles. With sufficient moisture again in 1993-1994, true fir attacked and killed by the fir engraver in 1994 should decrease to near average levels.

Sierra. True fir mortality and top-kill associated with the fir engraver decreased to more "normal" pre-drought levels throughout much of the southern Sierra Nevada. Areas with continued high levels of white fir mortality include the east side of the Lake Tahoe Basin, particularly the east shore and two areas on the Inyo National Forest; along Mammoth Scenic Loop Road and along Highway 395 east of Smokey Bear Flat. High levels also were found on the Sierraville Ranger District and the northern part of the Truckee Ranger District, Tahoe National Forest.

The fir engraver is the bark beetle primarily responsible for the losses noted under "fir" in Table 1.

RED TURPENTINE BEETLE, *Dendroctonus valens*.

North Coast. This bark beetle was found infesting several declining Bishop pines near Anchor Bay in Mendocino County.

Northern. Red turpentine beetle was a regular associate of the mountain, western and Jeffrey pine beetles in most of the pine mortality seen in northern California.

Fresh, resinous pitch tubes were more common than in previous years when only dry frass was produced in response to some attacks. This probably reflects the greater availability of soil moisture.

Sierra. Attacks by red turpentine beetle were not as common this year as in past years. New attacks were found on some fire scorched ponderosa pines in the A-rock area, Groveland Ranger District, Stanislaus National Forest, and on pines attacked by the Jeffrey pine beetle around Lake Tahoe.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae*.

North Coast. This beetle is a major pest of sugar pine and was involved in the death of a large sugar pine at Boggs Mountain Demonstration State Forest (Lake County) that also was infected with Schweinitzii root disease.

Northern. Sugar pine mortality, caused by drought and mountain pine beetle attacks, was widely scattered across northern California. Mortality in the larger size classes of sugar pine was particularly evident. Sugar pine mortality was noted around Indian Valley-Hyampom in Trinity County. Specific areas of sugar pine mortality in Siskiyou County include the Scott River, South Fork of Salmon River, Klamath River, and Elk Creek drainages, as well as an area south of Medicine Lake roughly bounded by Nine Buck Butte, Six Shooter Butte, Sand Flat Well, and Stillwater Butte. There are a few large sugar pines which have been killed near the Manzanita Lake entrance to Lassen Volcanic National Park in eastern Shasta County. Numerous large sugar pines were killed by mountain pine beetle on the Bogard Buttes, Lassen County. Large pockets of mortality occurred on private lands near Pondosa, Siskiyou County, and on the Almanor Peninsula, Plumas County. Inspection of pockets of sugar pine mortality near Pondosa revealed very few currently infested trees relative to those killed in 1992. At Latour Demonstration State Forest, Shasta County, both sugar pine and white pine were killed.

Lodgepole pine mortality was moderate on 1,380 acres of the Goosenest Ranger District Klamath National Forest, Siskiyou County. These areas of moderate lodgepole pine mortality contain a volume of 3.62 MMBF (million board feet), and an additional 10,300 acres of high lodgepole pine mortality contain a volume of 108.15 MMBF. Specific locations of lodgepole pine mortality include Military Pass, The Whaleback, Harts Meadow, Antelope Creek, Tamarack Flat, Tamarack Lake, and west of Typhoon Mesa. Mountain pine beetle

and drought were involved in the death of many small diameter lodgepoles (4 to 14 inches dbh) on the Lassen National Forest in eastern Shasta and Lassen Counties. Mountain pine beetle was also present in about a dozen old whitebark pine trees which died along the Brewer Creek Trail on Mt. Shasta, Siskiyou County.

Sierra. Mortality of sugar pine attributed to mountain pine beetle increased on the Hume Lake Ranger District, Sequoia National Forest and in Yosemite National Park. Groups kills of 10 to 15 sugar pine trees are quite common along Highway 120 above the Big Oak Flat entrance to Yosemite National Park. In addition, large sugar pine continue to be killed by mountain pine beetle on the Kings River District, Sierra National Forest. Lodgepole pine mortality from this bark beetle was reported from the Slaughterhouse Canyon, Meeks Creek, and other locations around Lake Tahoe.

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae*.

North Coast. This bark beetle was found attacking several Douglas-firs that were declining from black stain and Armillaria root diseases on the Jackson State Demonstration State Forest (Mendocino County). They also were associated with the presence of Armillaria root disease on Douglas-firs at Soquel in Santa Cruz County, and along with the flatheaded fir borer, were attacking uninfested Douglas-firs at Rainbow Ridge (Humboldt County) and Jackson Demonstration State Forest (Mendocino County).

Northern. A few infested trees were found between Gunsight Peak and Deadwood Creek, approximately 8 miles west of Yreka, Siskiyou County. Severe dwarf mistletoe infestation and several years of drought played major roles in the death of these trees.

JEFFREY PINE BEETLE, *Dendroctonus jeffreyi*.

Northern. Many old growth Jeffrey pine have been killed in the northern half of Lassen Volcanic National Park, from Manzanita Lake to Upper Kings Creek Meadow. Old growth Jeffrey pine has also been killed north of the Manzanita Lake entrance to Lassen Park, and north of the Butte Lake entrance. Many groups of pole-size Jeffrey pine have been killed by Jeffrey pine beetle in Lassen County in an area bounded by Lost Spring, Pole Spring, Duck Lake, and Butte Creek. Severe drought during 1991 and 1992 contributed to the increase in the number of trees killed by Jeffrey pine beetle in Lassen County. Some additional trees were

successfully attacked during 1993, although the number appears to be greatly reduced from previous years.

Sierra. Above normal levels of Jeffrey pine mortality associated with the Jeffrey pine beetle continued in several areas around Lake Tahoe and on the Inyo National Forest. Specifically, increasing mortality has been observed in the Nevada Beach Campground, Zephyr Cove Resort, Slaughterhouse Canyon, Secret Harbor and several other areas on the east shore of Lake Tahoe as well as in the Camp Richardson and Estates area of the south shore. Jeffrey pine mortality was also noted in the Smokey Bear Flat area on the Inyo National Forest.

ROUNDHEADED FIR BORER, *Tetropium abietis*.

Northern. The roundheaded fir borer was present in many of the larger diameter red and white firs which died in northern California. Infestations by the roundheaded fir borer generally appeared unimpressive because they were overshadowed by massive infestation by the fir engraver.

Sierra. Extensive woodborer activity was not noted this year as in recent years when fir engraver related mortality was above normal.

FLATHEADED FIR BORER, *Melanophila drummondi*.

North Coast. This borer attacked a small number of Douglas-fir at Boggs Mountain Demonstration State Forest (Lake County), one black stain infected Douglas-fir at Soquel Demonstration State Forest in Santa Cruz County, and several isolated or fire scorched Douglas-fir on Rainbow Ridge, Humboldt County. An on-going survey at Jackson Demonstration State Forest (Mendocino County) has found 79 attacked Douglas-fir thus far. Over 70% of the attacked trees were infected with black stain root disease, eight (10%) had Armillaria root disease, and eleven attacks occurred in conjunction with attacks by the Douglas-fir beetle.

Sierra. Extensive woodborer activity was not noted this year as in recent years when fir engraver related mortality was above normal.

CALIFORNIA FLATHEADED BORER, *Melanophila californica*.

Northern. Drought stress has been severe enough in northern California that most dead and dying pines have evidence of infestation by California flatheaded borer.

DOUGLAS-FIR ENGRAVER, *Scolytus unispinosus*.

North Coast. Attacks by this beetle were only reported from the Jackson Demonstration State Forest (Mendocino County), where they were frequently associated with the presence of black stain root disease.

CEDAR BARK BEETLE, *Phloeosinus* sp.

Northern. Mortality of suppressed, understory incense cedar was quite common in some of the drier locations. Mortality was particularly noticeable in eastern Siskiyou County, in an area between Bartle and Medicine Lake. Understory cedar mortality was also high in adjacent Modoc County, north of Ahjumawi Lava Springs State Park. Most of this mortality can be attributed to attacks by cedar bark beetles on extremely drought-stressed trees.

A cedar bark beetle also caused flagging and top-kill in a few Leyland cypress near Ukiah.

GYPSY MOTH, *Lymantria dispar*.

California. The last reported detection of a gypsy moth in a Delta/GM trap was August 25, 1993. As of October 12, twelve gypsy moths had been trapped in seven counties -- Alameda, Los Angeles, Mariposa, Orange, San Diego, Santa Clara, and Shasta (Table 2).

Oregon.¹ Status at the Beginning of the 1993 Survey Season. In 1992, 47 gypsy moths were detected, all in western Oregon. "Eighteen moths were detected near Philomath (Benton County). Four hundred and forty acres were treated there by air in 1993. Three small ground application sites totaling 12 acres, were treated

1 Taken all or in part from the report: Mudge, A.D., D.J. Hilburn, and Kathleen Johnson. 1993. Gypsy Moth Detection, Eradication, and Quarantine programs in Oregon. Oregon Dept. Agr., Plant Division, Salem, OR 97310-0110. Presented at the Annual Gypsy Moth Review, Nov. 1-4, 1993, Harrisburg, PA

Table 2. Location and Number of Gypsy Moths Caught in California in 1993

County	City
Alameda	Albany (3)
Los Angeles	Downey (1)
	Montebello (1)
Mariposa	Wawona (1)
Orange	Anaheim (1)
	Irvine (1)
	Newport Beach (1)
San Diego	Serra Mesa (1)
Santa Clara	Saratoga (1)
Shasta	Redding (1)

in the greater Portland metropolitan area. The aerial eradication program consisted of three applications of B.t.k. (24 B.I.U./0.5 gal/acre, Dipel6AFtm) applied by helicopter. Ground application programs consisted of two applications of B.t.k. (16 B.I.U./43 oz/100 gal, Dipel6AFtm) applied to all host trees and shrubs. All eradication programs took place during April and May."

The 1993 Survey Program. Approximately 14,300 gypsy moth traps were placed statewide in 1993 -- approximately 11,475 survey, and 2,800 post treatment, mass trapping and delimitation traps. "Early detection of new introductions continues to be the main focus of the detection program in order to keep eradication programs as small as possible. Traps were concentrated in western Oregon where most population centers and gypsy moth host material are located. However, all cities and towns statewide are considered at risk and are trapped each year.

"Seventy-eight gypsy moths have been found to date (November 1, 1993), at seven new and three old sites, all in western Oregon (Table 3). Four new sites are single detections and three new sites are clusters of three to eight moths. No moths have been found at three of the four 1993 eradication sites. Two male moths and a single female moth were found in a mass trapping area centered on a ground application site in SW Portland. The female moth was found in the vicinity of the positive trap. All moths were found at a residence located several properties outside the ground treatment area. Six moths and several old life stages on an outdoor household article were found in the same area last year.

"Fifty three moths and approximately 26 egg masses were found in a mass trapping area in Lake Grove (Clackamas County). Two moths were found there in 1992 and three moths in 1991. The highest trap catches

and majority of egg masses were found in and adjacent to a builder's supply yard. Due to the risk of transporting gypsy moth egg masses on wood products out of the area, a compliance agreement requiring the inspection of plants, plant parts, wood products, or any other items from the affected area prior to movement was implemented with the supply yard.

"Nine gypsy moths were detected in Lane County where over 19,000 gypsy moths were detected in 1984 resulting in the largest gypsy moth eradication program in the western U.S. during 1985-1988. Eight moths were found in four traps in Veneta (Lane County) and a single moth was detected approximately ten miles south-east of Veneta.

"No moths were detected at two mass trapping sites in Beaverton (Washington County) and Aurora (Marion County) where three moths were detected at each site in 1992. Four sites where single detections were made in 1992 were negative this year, and a single moth was detected approximately three miles east of where a single detection in Oregon City (Clackamas County) was made in 1992.

"All 78 gypsy moths detected in 1993 were submitted to the USDA Otis Methods Development Center for nuclear genome DNA sequencing to determine whether they are of the Asian or European (North American) strain. This technique, unlike the mitochondrial DNA sequencing technique used in 1991 and 1992, can detect hybrid Asian-European genotypes and was not available until this year."

Asian Gypsy Moth Detection Program. Approximately 34,000 traps (16/sq mi for 20 miles inland) were left in place in the fall of 1992 along shipping lanes on the Columbia River from Astoria to Portland, and around the Ports of Portland and Coos Bay as part of the Asian Gypsy Moth detection program. In 1993, "sixteen traps per square mile were replaced in these areas from 0-5 miles inland, and up to four traps per square mile were replaced from 6-20 miles inland with new traps. Guidelines for identifying and inspecting ships at risk for Asian gypsy moth developed by USDA-APHIS remain in effect. These policies have reportedly been successful in deterring high-risk ships from entering U.S. ports as relatively few high-risk ships have entered North American ports this year."

DOUGLAS-FIR TUSSOCK MOTH, *Orgyia pseudotsugata*.

Northern and Sierra. Average trap catches for 1993 remained at low levels throughout California. There

Table 3. 1993 Gypsy Moth Detections in Oregon					
County	Area	Site	No. GM's	Trap Density	Status
Clackamas	Carver	New	6	16/sq mi	(increased)
	Lake Grove	Old	53	mass trapped	
	Sandy	New	3	1/sq mi	
	Oregon City	Old	1	16/sq mi	
Clatsop	Seaside	New	1	16/sq mi	
Lane	Veneta	New	8	1/sq mi	(increased)
	Eugene	New	1	1/sq mi	
Multnomah	SW Portland	Old *	3	mass trapped	
Washington	Gales Creek	New	1	16/sq mi	
	Cedar Hills	New	1	16/sq mi	
Total:			781		
*. 1993 eradication site, ground application of B.t.k.					

were 143 plots (5 traps per plot) monitored in 1993. Of these, 135 plots (94%) had fewer than an average of 10 male moths per trap, and 71 plots (50%) caught no moths. There were no plots with more than an average of 25 moths per trap (considered the minimum number of moths for follow-up surveys). The detection plots in Modoc County that showed an increase in numbers of male moths caught in 1992 returned to low levels in 1993. Based on the results of the survey, significant activity by the Douglas-fir tussock moth is not anticipated in California in 1994.

MODOC BUDWORM, *Choristoneura retiniana*.

Northern. This budworm caused light to moderate damage on about 30,000 acres in the northern Warner Mountains of Modoc County in northeastern California. This acreage is markedly less than that reported in 1992. Spring weather patterns are considered to be responsible.

A CALIFORNIA SPRUCE BUDWORM, *Choristoneura carnana californica*.

Northern. For the eighth consecutive year, there was no visible defoliation of Douglas-fir by this budworm in Trinity County.

FALL WEBWORM, *Hyphantria cunea*.

North Coast. In Humboldt and Mendocino Counties, damage on madrone was less noticeable than in 1991 and 1992.

Northern. Webbing on Pacific madrone was present along the Klamath and Trinity River corridors, Siskiyou and Trinity Counties. Webbing did not appear to be as abundant as in 1991 and 1992. Feeding was very light and there did not seem to be any impact on the trees.

WHITE FIR SAWFLY, *Neodiprion* spp. complex.

Northern. An outbreak of white fir sawflies, *Neodiprion* nr. *deleoni* and *N. abietis*, at scattered locations between Eagle Lake and Lake Almanor, Lassen and Plumas Counties, continued into 1993. Defoliation was moderate to conspicuous, but not as severe as that seen in 1992. Populations of the sawflies apparently are declining. Although defoliation is limited to older foliage, drought conditions in 1992 were an additional stress to trees and resulted in a very poor complement of new needles. In 1993, abundant precipitation in the winter and spring resulted in a healthy complement of new needles, substantially lessening the concern over the vigor and visual impacts of defoliation.

Damage also was reported late in 1993 from the Onion Creek Experimental Forest, Tahoe National Forest (Placer County). This area will be surveyed in 1994.

A PINE SAWFLY, *Neodiprion nr. fulviceps*.

Northern. Approximately 80 acres of pine plantation located off the Everett Memorial Highway on Mt. Shasta were heavily defoliated by a pine sawfly. This appeared to be the third consecutive year that pine sawflies have caused defoliation in this general area. The area of heaviest defoliation has not been in the same location within the plantation each year. The sawflies are defoliating only Jeffrey pine, while adjacent ponderosa pine remains untouched. The defoliation has not caused any tree mortality. Several years of drought and heavy competition from brush are adding to any stress on the trees caused by the defoliation.

TENT CATERPILLAR, *Malacosoma* sp.

Sierra. Tent caterpillar populations in Inyo and Mono Counties remained at low levels in 1993.

LODGEPOLE NEEDLEMINER, *Coleotechnites milleri*.

Sierra. About 500 acres of lodgepole needleminer defoliation were reported in the Horse Meadows area in the Emigrant Wilderness on the Stanislaus National Forest. Horse Meadow is located about 2.5 miles from a new infestation in the Grace Meadows area (Yosemite National Park).

Visible defoliation was expected in 1993 in Yosemite National Park. This has indeed happened as new areas of infestation now cover 35,000 acres.

BLACK PINELEAF SCALE, *Nuculaspis californica*.

Northern. The black pineleaf scale infestation on sugar pine located to the south and west of Mt. Shasta, Siskiyou County, has apparently declined. Many sugar pine in this area had little foliage in the upper crowns during 1991 and 1992 due to defoliation caused by the scale infestation. These trees added a considerable complement of foliage at the growing tips during 1993.

Infestations of black pineleaf scale on ponderosa pine are still present from the Burney Basin east to the Fall River Valley, Shasta County. Ponderosa and sugar pines in scattered locations from Fall River to Alturas also have needle loss and crown decline caused by this scale. This general area is about 500,000 acres, but the acreage with impacted trees is much less. Precipitation during the winter and spring of 1993 resulted in improved needle length for many trees. Although no formal surveys were conducted, this would lead to fewer insects per needle given population stability. Scale abundance appears to be related to the recent drought and is expected to subside now that the trend in precipitation levels is toward average or above average.

Sierra. Black pineleaf scale infestations on sugar pine were reported along Highway 108 between Miwok Ranger Station and the Bald Mountain Lookout, Stanislaus National Forest, and from Yosemite National Park. Poor needle retention and chlorotic foliage were attributed to increasing or continued high numbers of scales in the upper one-third of the crown of these trees.

A TWIG BEETLE, *Pityophthorus* sp.

North Coast. A Monterey pine twig beetle, *Pityophthorus* sp., killed branches of Monterey pine in Mendocino County (near Cleone) that appeared to have prior branch injury from gouty pitch midge, *Cecidomyia pininopis*.

WEEVILS, *Pissodes* sp.

North Coast. Weevils in this genus mined and killed terminals of both Bishop and Monterey pine saplings at Point Arena and Philo in Mendocino County, and Timber Cove in Sonoma County. They also were found in a Douglas-fir sapling and an Armillaria-infected, pole-sized sugar pine on the Boggs Mountain Demonstration State Forest (Lake County).

DOUGLAS-FIR TWIG WEEVIL, *Cylindrocopturus furnissi*.

North Coast. This weevil caused twig mortality in a few Douglas-fir Christmas trees at Los Gatos (Santa Clara County) and in several trees at Sebastopol, Sonoma County.

AMBROSIA BEETLE, *Platypus wilsoni*.

Sierra. Ambrosia beetles, *Platypus wilsoni*, were found attacking white fir with varying levels of light-to-moderate fire injury/bark scorch around the fringes of the 1992 Cleveland Fire on the Eldorado National Forest. These ambrosia beetle attacks were apparently not associated with attacks by fir engravers or woodborers.

GOUTY PITCH MIDGE, *Cecidomyia piniinopsis*.

Northern. Tip flagging was seen in several ponderosa pine plantations on the Shasta-Trinity National Forest. A combination of heavy midge attack, brush competition, and drought may cause a few trees to be stunted or killed in a plantation located between Big Bend and Little Devils Mountain. This plantation is considered to be located within suitable habitat of the Northern Spotted Owl. Most management activities are currently prohibited in this area. Flagging of ponderosa pine tips was also visible in plantations near the Everett Memorial Highway on Mt. Shasta. The level of flagging was less than that seen during 1992. Only the ponderosa pines had flagging, while intermixed Jeffrey pine did not have this symptoms.

FRUITTREE LEAFROLLER, *Archips argyrospilus*.

Southern California. This Tortricid caused light to moderate defoliation of California black oak on about 8,000 acres of the Arrowhead Ranger District, San Bernardino National Forest. No defoliation was observed in other areas that have a history of outbreak and defoliation.

DOUGLAS-FIR NEEDLE MIDGES, *Contarinia* spp.

North Coast. These needle midges were infesting needles of Douglas-fir Christmas trees in Santa Clara

County (Los Gatos) and in Sonoma County (Sonoma). In Sonoma, adult populations were suppressed by spraying insecticidal soap.

SPRUCE APHID, *Elatobium abietinum*.

North Coast. The spruce aphid continues to infest and make unsightly Sitka spruce along Highway 101 north of Fortuna in Humboldt County. In February, samples north of Fernbridge averaged 9.1 aphids per 100 needles, and samples near Salmon Creek averaged 4.7 aphids per 100 needles. The Fernbridge trees were noticeably affected, whereas the appearance of trees at Salmon Creek was only slightly affected.

CONIFER APHIDS, *Cinara* spp.

Northern. Conifer aphids were very numerous on white fir in a number of widely separated locations in northern California. Aphid feeding was heavy enough on white fir seedlings in a plantation near Faulkstein Camp on the Klamath National Forest, Siskiyou County, to cause severe needle curling. Cool weather, and a small amount of rain, caused most of the needle symptoms to disappear by late summer. Aphid feeding was heavy on mature white fir on many of the eastside areas of the McCloud Ranger District of the Shasta-Trinity National Forest, and the Hat Creek and Eagle Lake Districts of the Lassen National Forest. Honeydew and sooty mold were very common on white fir foliage in these areas. By late summer, there were very high populations of yellow jackets in areas that had abundant conifer aphids and honeydew.

MADRONE PSYLLID, *Euphyllura arbuti*.

North Coast. This psyllid was found near Willits (Mendocino County) on many branches of madrones infected with madrone canker and a leaf-spotting fungus.

TABLE 4. Insects of Lesser Importance in California - 1993

Insects		Where Examined or Reported		
Scientific Name	Common Name	Host	County	Remarks
<i>Adelges cooleyi</i>	Cooley spruce gall aphid	DF	Santa Clara, Sonoma	Christmas tree farms
<i>Chionaspis pinifoliae</i>	Pine needle scale	MP, PP, SC	Marin, Siskiyou	Minor, China Camp. Heavily infested plantation in Red Rock Valley.
<i>Cinara occidentalis</i>	Giant conifer aphid	WF	Sonoma	Attacks on several Christmas trees.
<i>Contarinia oregonensis</i>	Douglas-fir cone midge	DF	Mendocino	Destroyed most of the cone crop near Willits.
<i>Dioryctria</i> sp.	Coneworm	DF	Sonoma	Found in the leaders of a few Christmas trees.
<i>Ergates spiculatus</i>	Ponderous borer	DF, PP	Lake, Mendocino	Found in surveys of state demonstration forests.
<i>Ips spinifer</i>	a pine engraver	PP	Lake	Found in a windthrown pine.
<i>Matsucoccus fasciculensis</i>	a needle fascicle scale	PP	Mendocino	Found within needle fascicles on flagged branches near Covelo.
<i>Phloeosinus sequoiae</i>	Redwood bark beetle	RW	Mendocino	The second-growth redwood killed had Armillaria root disease.
<i>Pseudohylesinus nebulosus</i>	Douglas-fir pole beetle	DF	Mendocino	Two observations at Jackson Demonstration State Forest; associated with black stain root disease and flatheaded fir borer.
<i>Pseudohylesinus sericeus</i>	Silver fir beetle	DF, WH	Mendocino	Five Douglas-fir had black stain root disease. Two hemlocks examined had Armillaria root disease.
<i>Pyrrhalta luteola</i>	Elm leaf beetle	Elm	Mendocino	Minor, Potter Valley
<i>Rhyacionia zozana</i>	Ponderosa pine tip moth	PP	Mendocino	Affected the terminals of a small number of pines near Willits.
<i>Synanthedon sequoiae</i>	Sequoia pitch moth	MP	Lake, Mendocino	Several infested trees were reported from Lakeport and Willits.
<i>Synanthedon</i> sp.	a pitch moth	DF	Mendocino	Found in Ukiah.
<i>Ulochaetes leoninus</i>	Lion beetle	GF	Mendocino	Found within a tree killed by fir engraver and annosus root disease.

TABLE 4. Insects of Lesser Importance in California - 1993 (continued)

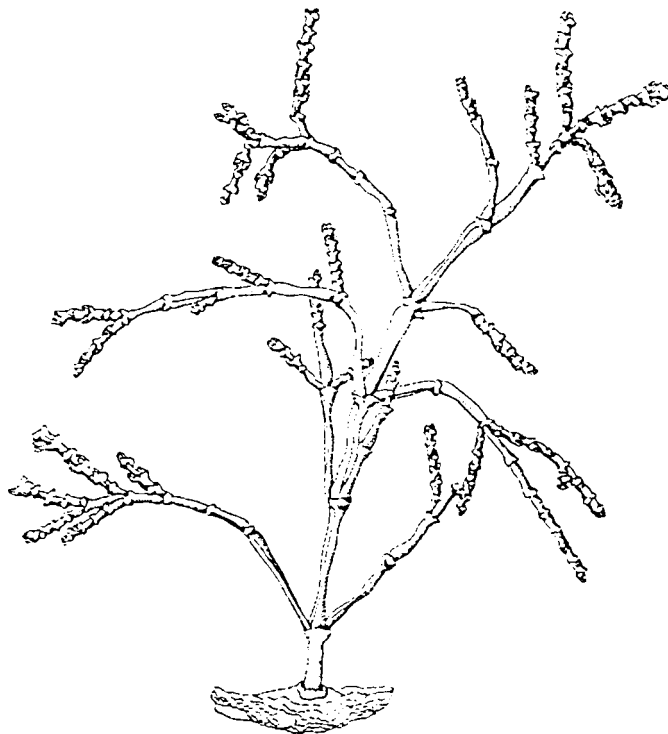
Insects		Where Examined or Reported		Remarks
Scientific Name	Common Name	Host	County	
Unknown	<i>Eryophid bud mite</i>	CJ	Mendocino	Mite caused stunted growth in a nursery.
Unknown	Flatheaded wood borer	KP	Lake	A large knobcone pine at the village of Lower Lake was killed by a yet unidentified borer.
Unknown	Mites	MxK	Humboldt	Damage to needles, Fortuna.
<i>Xylea</i> spp.	Primitive sawfly	Pine	Nevada, Tulare, Tuolumne, Douglas(NV)	Numerous larvae dropping from pines.
<i>Xylotrechus longitarsus</i>	a roundheaded wood borer	DF	Mendocino	Found in Douglas-fir killed by insects and black stain and Armillaria root diseases.

HOST ABBREVIATIONS

CJ = *Cryptomeria japonica*
 DF = Douglas-fir
 GF = Grand fir
 KP = Knobcone pine
 MA = Madrone
 MP = Monterey pine
 MxK = Monterey-Knobcone cross
 PP = Ponderosa pine
 RW = Redwood
 SC = Scots pine
 WF = White fir
 WH = Western hemlock

STATUS AND CONTROL OF DISEASE

A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL FROM THE DISEASE COMMITTEE



JESS RIOS, CHAIR
JACK MARSHALL, SECRETARY

STATUS AND CONTROL OF DISEASE

ABIOTIC DISEASES

Drought. Drought has continued to be a primary cause of mortality over northern California. Levels of mortality are higher in most areas, with all species affected to some extent. Sugar pine mortality throughout northern California has been high. White fir mortality has been especially severe in the east side pine and mixed conifer sites of northeastern California where trees were attacked by insects in late 1992. Attacks in 1993 have decreased because of improved precipitation, and mortality is expected to decrease in 1994.

Snow and Wind. Heavy wet snow and wind caused considerable storm damage in northwestern California. Patches of tanoak and alder up to 50 acres in size were damaged in the Smith River drainage (Del Norte Co.). Douglas-fir saplings in plantations on the Happy Camp RD, Klamath NF (Siskiyou Co.), had tops broken out. Considerable storm damage was present east of Mt. Shasta in white fir and ponderosa pine (Siskiyou Co.). About 3,000 board-feet of red fir was windthrown on South Fork Mountain, Hayfork RD, Shasta-Trinity NF (Trinity Co.).

Ozone. Twenty-five ozone-injury monitoring plots on the Sierra National Forest (Mariposa, Madera, and Fresno co's.) were examined, and the general trend was for pine foliage to show slightly more chlorotic mottle (injury) than was present when last inspected in 1991. This year, 15 plots exhibited increased injury, 5 showed less, and 5 remained unchanged from 1991. It was predicted that once precipitation returns to and remains at normal levels, pines would probably sustain more air pollution injury because of increased physiological activity and uptake of ozone.

Frost. Late fall to early winter frost caused dieback of 1-0 Douglas-fir and dieback and mortality of hundreds of 1-0 redwood seedlings at Ben Lomond nursery in Santa Cruz Co.

Flooding. Hundreds of bitterbrush seedlings were killed due to flooding caused by above-normal rainfall at Magalia nursery in Butte Co.

FOLIAGE DISEASES

Hardwood Pathogens. Spring rains in northern California produced conditions conducive to hardwood foli-

age pathogens. Several hardwood species were affected, including California black oak, Oregon white oak, blue oak, valley oak, alder, Pacific madrone, and Oregon ash. *Mycosphaella fraxinicola* was identified on Oregon ash near Seiad along the Klamath River (Siskiyou Co.). *M. arbuticola* blighted Pacific madrone in Mendocino Co. Red alder, also near Seiad, was infected by *Cylindrosporium alni*.

Oak leaf pathogens, including anthracnose, prevailed elsewhere. Anthracnose, caused by *Apignomonina quercina* (= *Discula quercina*), infected blue, valley, and black oaks in the Sacramento Valley, and black oaks elsewhere. Other oak leaf pathogens of mostly black oak and some white oak included *Cylindrosporium kelloggii* and *Septoria quercicola*. *Taphrina caerulescens* caused oak leaf blister of blue oaks in Tuolumne Co.

Needle Casts. Sugar pine needle cast, *Lophodermella arcuata*, was widespread throughout the crowns of all size classes of western white pine along Swift Cr. in the Trinity Alps Wilderness (Trinity Co.), on the South Fork of the Sacramento River (Siskiyou Co.), on the East Fork of the Trinity River (Trinity Co.), and on Scott Camp Creek near Castle Lake (Siskiyou Co.). This is the second consecutive year of this outbreak in these areas. The disease also infected sugar pine in the Fall River drainage (tributary of Lake Oroville) in Butte Co.

Cyclaneusma needle cast, *Cyclaneusma minus*, of Monterey pine affected scattered Monterey pines around Lakeport (Lake Co.).

Lophodermium spp. were identified on ponderosa pine early in the summer along the Klamath River from Seiad east to Lumgrey Creek (Siskiyou Co.). Last year's foliage was affected and the visual effect was dramatic until this year's foliage appeared.

NURSERY DISEASES

Fusarium root rot, *Fusarium oxysporum*, killed several hundred big cone Douglas-fir at Ben Lomond nursery in Santa Cruz Co. *Fusarium* sp. also infected 1-0 WF seedlings scattered throughout a field of 500,000 trees in early June at the Humboldt nursery. Symptoms observed included stunting and chlorosis. By July most of the seedlings had recovered and were putting on new growth.

At the Chico Genetic Resource Center (Butte Co.), *Fusarium* sp. killed between 10% and 20% of the following stock types: 1-0 sugar pine, 1-0 white fir, 2-0 white fir, and 1-0 Douglas-fir. Fifteen percent of the highly valuable, 1-0 sugar pine selected for major gene resistance to white pine blister rust was also killed.

In August, 300,000 1-0 red fir at Humboldt nursery were losing foliage at their tips and showing branch dieback due to gray mold, caused by *Botrytis cinerea*. Thousands of 2-0 Douglas-fir also suffered dieback of their lower branches due to gray mold. The seedling canopy had closed creating stagnant air pockets, which favors the disease's development.

1-0 western hemlock of one seedbed (10,000 trees) had swellings on the stem just above the soil-line, tip dieback, and defoliation. The cause of the tip dieback was gray mold, but the cause of the unusual swelling was not determined (Humboldt nursery).

Cedar leaf blight, *Didymascella thujina*, caused defoliation of lower leaflets on 10% of the western red cedar crop. Damage was less severe than in past years (Humboldt nursery).

Sirococcus shoot blight, *Sirococcus strobilinus*, infected 10 to 20 Eldarica pine seedlings at Ben Lomond nursery in Santa Cruz Co. The disease also caused deformation and mortality of 1-0 Jeffrey pine at Humboldt nursery. Hundreds of seedlings were infected and suffered various levels of distortion.

Various birds feasted upon sugar pine seed after breaking through the protective netting at Ben Lomond nursery. Injuries caused by birds, netting, and cutworms killed thousands of 1-0 Jeffrey pine shortly after emergence at Humboldt nursery.

ROOT DISEASES

Black stain root disease, *Leptographium wageneri* v. *pseudotsugae*, was again reported in many areas of northern California in plantations and mature trees in natural stands of Douglas-fir. Minor disease levels were detected as far south as Santa Cruz Co. Black stain was identified along a road on Scott River RD, Klamath NF (Siskiyou Co.), relatively close to an area with significant levels of black stain root disease of ponderosa pine (caused by *L. wageneri* v. *ponderosae*).

In a survey of Jackson Demonstration State Forest (JDSF, Mendocino Co.) 426 Douglas-fir in 169 locations were dead or severely declining from black stain

infection. At Boggs Mountain Demonstration State Forest (BMDSF, Lake Co.) 23 infected trees were detected in 5 sites, and Soquel Demonstration State Forest (SDSF, Santa Cruz Co.) had two trees at one site. Three additional new sites were detected in Santa Cruz Co., two in San Mateo Co., two in Sonoma Co., and three in Humboldt Co.

Black stain in ponderosa pine was detected near Burney (Shasta Co.) along Black Ranch Rd. Local stand conditions suggest other centers may be present. The disease was also confirmed in ponderosa pine at Last Chance and Whalen Springs on the Doublehead and Big Valley RD's, Modoc NF (Modoc Co.). Several hundred acres are infested with black stain and bark beetles in centers with lots of downed material, indicating the centers may have been initiated many years ago.

Armillaria root disease, *Armillaria* sp., contributed to the demise of a ponderosa pine near Lava Campground, Big Valley RD, Modoc NF (Modoc Co.). The tree was also infested with several other insects and diseases leading to its death.

The disease was also found in association with many conifers on the State Forests. It infected Douglas-fir at SDSF, JDSF, and BMDSF, ponderosa and sugar pine at BMDSF, and western hemlock, grand fir, redwood, and Monterey cypress at JDSF.

Annosus root disease, *Heterobasidion annosum*, was found killing a few sugar pine and ponderosa pine seedling-saplings at BMDSF, and 12 grand fir and one Douglas-fir at JDSF.

The range of Port-Orford cedar root disease, *Phytophthora lateralis*, did not expand significantly in the past year. It remains limited to extreme northwestern California. Attempts to eradicate the fungus from a limited infection site at the headwaters of Coon Creek, Smith River National Recreation Area, Six Rivers NF, were not immediately successful. Trees had been felled on the site, and then a prescribed burn was used in the hope of heating the site sufficiently to at least kill the fungus in the upper layers of the soil. Inadequate heat was generated; however, the removal of the host by the fire may prove beneficial in limiting spread of the fungus.

Schweinitzii root disease, *Phaeolus schweinitzii*, was found infecting a few dead and dying Douglas-fir on JDSF and sugar pine on BMDSF. In Standish-Hickey State Park (Mendocino Co.) sporophores were found around the roots of one windthrown and one standing, but declining, Douglas-fir.

Within the Lake Tahoe Basin Management Unit (El Dorado Co.) a tree inventory was completed on 100 acres in the Tallac Historic Site. The survey was designed to provide information on individual tree health or condition because of Jeffrey pine failures that have occurred during winter storms the past three years. Most of the blowdown appears associated with the presence of *P. schweinitzii*.

Poria albipellucida butt rot contributed to the failure of an 80 inch DBH redwood at Muir Woods National Monument (Marin Co.). The site is quite wet, and the tree failed on a calm day in April. The tree had formed sprouts and callus tissue surrounding an old basal injury.

A few *Resinicium* (*Odontia*) sp. conks were found on a windthrown ponderosa pine on BMDSF. The role of this fungus regarding predisposition to windthrow is unknown.

BRANCH AND STEM DISEASES

Pitch canker, *Fusarium subglutinans*, is now confirmed as infecting numerous Monterey pine in the northern Santa Rosa area (Sonoma Co.).

Botryosphaeria dothidea (*ribis*) caused top and branch mortality of giant sequoia and coast redwood in interior portions of Sonoma and Mendocino Counties.

Madrone canker, *Fusicoccum aesculi*, continues to degrade madrones and manzanita in Humboldt, Lake, Mendocino, and Santa Cruz Counties.

Stem decay from *Phellinus pini* was detected in Douglas-fir in Lake and Mendocino Co., grand fir in Mendocino Co., and ponderosa pine in Lake Co.

Diplodia pinea caused scattered branch dieback in ponderosa pine at elevations of 1000-to-1500 feet in the City of Shasta and near Whitmore (Shasta Co.). Stress from poor site conditions and wet spring weather are likely to have contributed to infection.

Conks of *Stereum hirsutum* were abundant on dying stems of scattered live oak and tanoak throughout Mendocino Co.

Fire blight, *Erwinia amylovera*, was identified killing twigs of wild plum in pine plantations around Mt. Shasta, especially in the vicinity of the Everett Memorial Highway (Siskiyou Co.).

Fomitopsis cajanderi conks were found on portions of many Douglas-fir stumps in a "turn-up" Christmas tree farm in Los Gatos (Santa Clara Co.). Some of the stumps were supporting their fourth generation of stems.

Daldinia grandis was found on stems of recently killed live oak in Mendocino Co. and tanoak in Santa Cruz Co. (SDSF).

MISTLETOES

The effects of white fir dwarf mistletoe, *Arceuthobium abietinum* f. sp. *concoloris*, infections changed noticeably as the latest drought period extended through multiple years. Infections were commonly associated with branch flagging and tree mortality, the latter caused by attacks of the fir engraver beetle, *Scolytus ventralis*.

Pre-suppression surveys for dwarf mistletoe, *Arceuthobium* spp., of ponderosa and sugar pines were completed on 9,163 acres that are part of the Stanislaus Complex Burn of 1987 (Tuolumne and Mariposa Co.'s.). The data collected will be used to make decisions in the following treatments: tree removal, shifting species mixtures, and pruning.

A lodgepole pine dwarf mistletoe, *A. americanum*, suppression project was completed in Twin Lakes Campground on the Mammoth RD, Inyo NF. About 30 campsites were included in the treatment area. Most of the project involved removal of witches' brooms with some pruning to remove all visible infections and a few tree removals. This is the first dwarf mistletoe suppression project involving lodgepole pine in a Sierra Nevada national forest.

Western dwarf mistletoe, *A. campylopodum*, infects ponderosa pine and *A. occidentale* infects Digger pine at scattered locations in Lake and Mendocino co's.

RUST DISEASES

White pine blister rust, *Cronartium ribicola*, caused conspicuous mortality of sugar pine branches, seedlings, and saplings in several Sierra Nevada locations. Sites included the Rogers Ridge, McKinley Grove, and Shaver Lake areas on the Sierra NF, plus the Donnell Vista area on the Stanislaus NF. The lethal cankers responsible for tree mortality dated back to 1983-84 infections.

In northern California, levels of blister rust were low on *Ribes* spp.; this was most likely due to the dry summer conditions.

Western gall rust, *Endocronartium harknessii*, is spreading on Jeffrey pine on the Big Valley RD, Modoc NF (Modoc Co.). The main infestation is 15 miles east of Snell Butte, where the disease was detected eight years ago. Trees were also infested with needle sheath miner and pine shoot borer.

Other western gall rust infections were noted on Bishop and Monterey pines in Mendocino Co., and scattered Monterey pine in Lake Co.

DUTCH ELM DISEASE

As of October 20, 1993, 51 elm trees from seven counties in California were confirmed for Dutch elm disease, *Ceratocystis ulmi* (DED; Table 5.). Lab diagnosis and positive tree totals were generated from samples submitted by CDF's Sacramento field office, individuals, tree services, or cities.

The positive tree total for Sacramento Co. results from intensive survey and sampling by CDF through June 30, and the City of Sacramento's effort to keep abreast of

the disease after July 1, 1993. Tree totals for other counties were a result of individuals, tree services, or cities submitting samples for diagnosis. In past years the number of confirmations more accurately reflected the disease intensity in the state.

Confirmation numbers this year may not truly reflect overall disease intensity due to the limited survey and sampling efforts after CDF reduced its DED staff. CDF's DED diagnostic lab was scheduled to close at the end of October, 1993.

The state's exterior and interior quarantine and eradication proclamation regulations relating to DED are in the process of being repealed. The county agricultural commissioners have, at the same time, been strongly urged by CDFA to cease enforcement of the quarantine.

A study done by the USDA (Peacock and Schmidt, 1985²) on DED in California estimates that, with termination of the DED project, DED incidence in the San Francisco Bay Area's American and European elm populations (0.5% last year) will escalate to an estimated 15% within ten years. As a result, up to 50% of the trees will die by that time. The study further predicts that in ten years DED could be found in all areas of the state, although more commonly in the northern and coastal areas.

TABLE 5. NUMBER OF TREES CONFIRMED WITH DUTCH ELM DISEASE

COUNTY	1988	1989	1990	1991	1992	1993
Alameda	3	3	23	28	32	0
Contra Costa	35	34	38	29	25	3
Marin	91	82	46	56	62	9
Napa	9	5	4	7	3	3
Sacramento	0	0	10	7	24	23
San Mateo	70	48	60	108	95	7
Santa Clara	35	32	51	44	29	4
Solano	0	0	0	0	8	0
Sonoma	12	3	6	20	18	2
Total	255	207	238	299	297	51

2 Peacock, John and James Schmidt. 1985. Ten year evaluation and prospects for the future of DED control programs. USDA Forest Service.

TABLE 6. FOREST DISEASES REPORTED - 1993^a

<u>AGENT</u>	<u>HOST</u>	<u>COUNTY</u>
<u>ABIOTIC INJURIES</u>		
Frost	DF,RW	Santa Cruz
Flooding	BB	Butte
Ozone	Pines	Mariposa,Madera, Fresno
Drought	Many species	No. California
Snow and Wind	TO,AL,DF,WF, PP,RF	NW California
<u>BRANCH AND STEM DISEASES</u>		
<i>Botryosphaeria dothidea</i>	GS,RW	Sonoma, Mendocino
<i>Ceratocystis ulmi</i>	Elms	Contra Costa,Marin, Napa,Sacramento,San Mateo,Santa Clara, Sonoma
<i>Daldinia grandis</i>	TO,Oak spp.	Santa Cruz,Mendocino
<i>Diplodia pinea</i>	PP	Shasta
<i>Erwinia amylovera</i>	WPI	Siskiyou
<i>Fomitopsis cajanderi</i>	DF	Santa Clara
<i>Fusarium subglutinans</i>	MP	Sonoma
<i>Fusicoccum aesculi</i>	PM,Mz	Humboldt,Lake,Santa Cruz,Mendocino
<i>Inonotus andersonii</i>	QK	Lake
<i>Phellinus ferruginosus</i>	CL	Mendocino
<i>Phellinus gilvus</i>	QW	Mendocino
<i>Phellinus pini</i>	PP GF DF	Lake Mendocino Lake,Mendocino
<i>Seridium cardinale</i>	LC	Mendocino
<i>Stereum hirsutum</i>	TO,QW	Mendocino

TABLE 6. FOREST DISEASES REPORTED - 1993 (continued)

<u>AGENT</u>	<u>HOST</u>	<u>COUNTY</u>
<u>FOLIAGE DISEASES</u>		
<i>Apignomonina quercina</i> (= <i>Dascula quercina</i>)	QD,QK,QL QK	Sacramento Valley No. California
<i>Cyclaneusma minus</i>	MP	Lake
<i>Cylindrosporium alni</i>	RA	Siskiyou
<i>Cylindrosporium kelloggii</i>	QG,QK	No. California
<i>Lophodermella arcuata</i>	WWP SP	Trinity,Siskiyou Butte
<i>Lophodermium</i> spp.	PP	Siskiyou
<i>Mycosphaella arbuticola</i>	PM	Mendocino
<i>Mycosphaella fraxinicola</i>	OA	Siskiyou
<i>Septoria quercicola</i>	QG,QK	No. California
<i>Taphrina caerulescens</i>	QD	Tuolumne
<u>NURSERY DISEASES</u>		
<i>Botrytis cinerea</i>	DF,RF	Humboldt
<i>Didymascella thujina</i>	WRC	Humboldt
<i>Fusarium oxysporium</i>	DF	Santa Cruz
<i>Fusarium</i> spp.	WF,DE,SP	Humboldt
<i>Strococcus strobilinus</i>	EP JP	Santa Cruz Humboldt
<u>PARASITIC PLANTS</u>		
<i>Arceuthobium abietinum</i> f. sp. <i>concoloris</i>	WF	NW California
<i>Arceuthobium americanum</i>	LPP	Mono
<i>Arceuthobium californicum</i>	SP	Mariposa,Tuolumne
<i>Arceuthobium campylopodum</i>	PP	Mariposa, Tuolumne, Lake, Mendocino
<i>Arceuthobium occidentale</i>	DP	Lake
<i>Phoradendron villosum</i>	CL	Mendocino

TABLE 6. FOREST DISEASES REPORTED - 1993 (continued)

<u>AGENT</u>	<u>HOST</u>	<u>COUNTY</u>
<u>ROOT DISEASES</u>		
<i>Armillaria</i> sp.	PP DF	Modoc, Lake Mendocino, Santa Cruz
<i>Heterobasidion annosum</i>	PP,SP DF,GF	Lake Mendocino
<i>Leptographium wageneri</i> v. <i>ponderosae</i>	PP	Modoc,Siskiyou, Shasta
<i>Leptographium wageneri</i> v. <i>pseudotsugae</i>	DF	Santa Cruz,San Mateo, Sonoma & No. California Co's
<i>Phaeolus schweinitzii</i>	JP DF SP	El Dorado Mendocino Lake
<i>Phytophthora lateralis</i>	POC	Del Norte,Siskiyou
<i>Poria albipellucida</i>	RW	Marin
<i>Resinicium</i> sp.	PP	Lake
<u>RUST DISEASES</u>		
<i>Cronartium ribicola</i>	SP	Fresno,Tuolumne
<i>Endocronartium harknessii</i>	JP BP MP	Modoc Mendocino Lake, Mendocino

a. Not a complete listing for all locations reported, nor for reports of common diseases.

HOST ABBREVIATIONS

AL=Alder	GS=Giant sequoia	POC=Port-Orford-cedar
BB=Bitterbrush	JP=Jeffrey pine	PP=Ponderosa pine
BP=Bishop pine	LC=Leyland cypress	QD=Blue oak
CL=Cal. laurel	LPP=Lodgepole pine	QG=Oregon white oak
DF=Douglas-fir	MC=Monterey cypress	QK=Black oak
DP=Digger pine	MP=Monterey pine	QL=Valley oak
EP=Eldarica pine	Mz=Manzanita	QW=Interior live oak
GF=Grand fir	PM=Pacific madrone	RA=Red alder
RF=Red fir	TO=Tanoak	WPI=Wild plum
RW=Redwood	WF=White fir	WRC=Western red cedar
SP=Sugar pine	WH=Western hemlock	

STATUS AND CONTROL OF ANIMAL PESTS

A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL FROM THE ANIMAL DAMAGE COMMITTEE



SCOTT WARNER, CHAIR
JOHN BORRECCO, SECRETARY

STATUS AND CONTROL OF ANIMAL PESTS

INTRODUCTION

This report summarizes the Animal Damage Committee's annual survey of vertebrate damage to forest trees. The survey is accomplished by mailing a simple form to private timber companies, federal and state agencies, and other organizations who manage forested lands in California. The survey form requests summary information by pest species regarding species of trees injured, age class of trees, acres over which damage occurs, number of trees per acre damaged, whether damage occurs in plantations or other areas, the general trend in damage relative to past conditions, and control methods used. Results of this survey are reported as part of the California Forest Pest Council's annual overview of forest pest conditions in California.

In August, 1993, 98 survey forms were mailed to federal and state agencies, private timber companies, and other private organizations managing forested lands in California. A total of 37 (38% return) responses were received.

RESPONDENTS AND LOCATION OF REPORTS

Survey forms were returned by representatives of the U.S. Forest Service (n= 18); California Department of Forestry and Fire Protection (n=5); private timber companies (n=7); and various other organizations (n=7) including the National Park Service (4) and the Bureau of Land Management (3).

Incidence of damage to trees was reported from 34 counties representing over ¾ of the land area of California. Counties represented: Alpine, Amador, Butte, Calaveras, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Kern, Lake, Lassen, Madera, Marin, Mariposa, Mendocino, Modoc, Mono, Monterey, Nevada, Placer, Plumas, Riverside, San Benito, San Bernardino, San Diego, Santa Cruz, Shasta, Sierra, Siskiyou, Sonoma, Tehama, Trinity, Tulare, Tuolumne, Ventura, and Yuba.

SPECIES CAUSING DAMAGE

A variety of mammal species are causing damage to forest trees and the damage varies by region of the state and by land ownership (Table 7). Species most commonly

Table 7. Number of damage responses reported by vertebrate species (N=37).					
Species	USFS	CDF	Private	Other	Total
Beaver	2	0	0	0	2
Birds	2	1	0	0	3
Black Bear	2	2	1	0	5
Deer	15	1	5	1	22
Wood Rat	0	0	2	0	2
Elk	1	0	1	0	2
Meadow mice	1	0	0	0	1
Mountain Beaver	1	0	0	0	1
Pocket gopher	15	0	5	0	20
Porcupine	9	1	1	0	11
Rabbits and hares	8	1	0	0	9
Tree squirrels	3	2	0	1	6
Domestic stock	10	0	3	2	15
Feral Pigs	0	0	0	1	1
Gound squirrels	0	0	1	0	1
Total	69	8	19	5	101
(n)	(18)	(5)	(7)	(7)	(37)

identified in this survey (as well as in previous years) as causing problems are deer (59% of respondents), pocket gopher (54%), domestic stock (41%), porcupine (30%), rabbits and hares (24%), and black bear (14%). Deer, pocket gophers and livestock feeding injuries on trees occur throughout the State on most ownerships. Damage by other species tends to be more limited geographically.

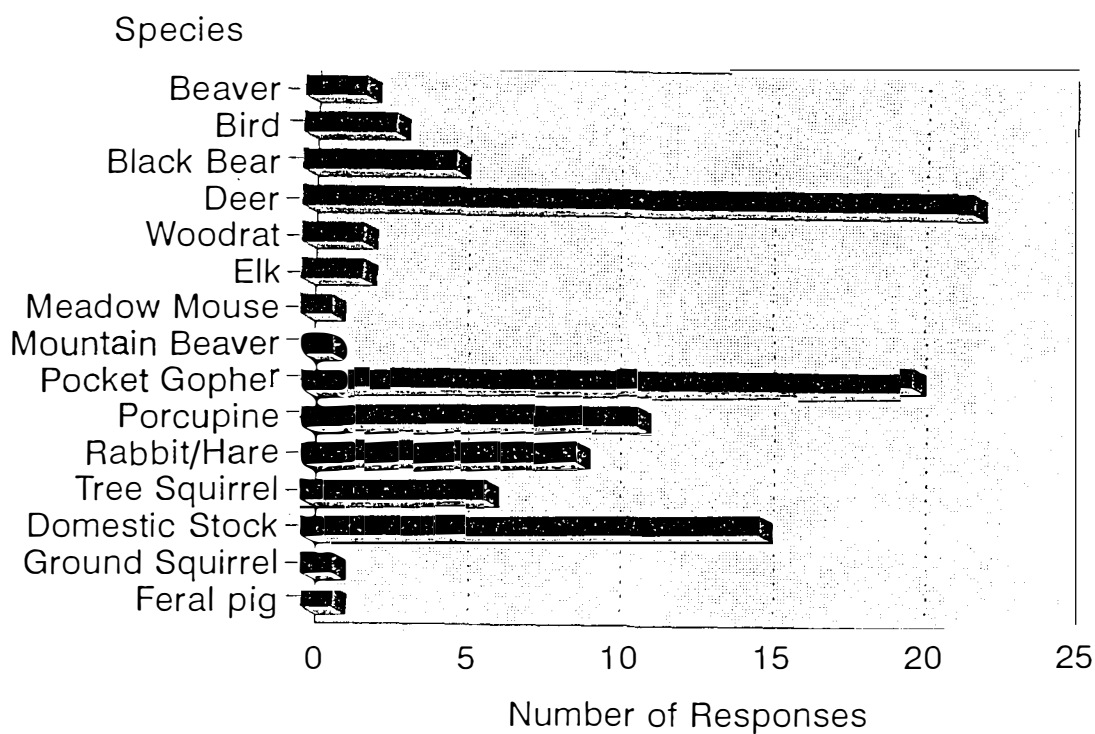
SCOPE OF DAMAGE

Damage from all sources was reported on about 130,495 acres (Table 8). All of California's major timber producing regions and timber types have reported damage by vertebrate species. Based on the acres of damage, the species ranking changes only slightly: black bear (31% of the acres), pocket gopher (27%), deer (24%), porcupine (6%), and domestic stock (4%), birds (2%), tree squirrels (2%), woodrat (1%), rabbits and hares (1%), and all others (1%).

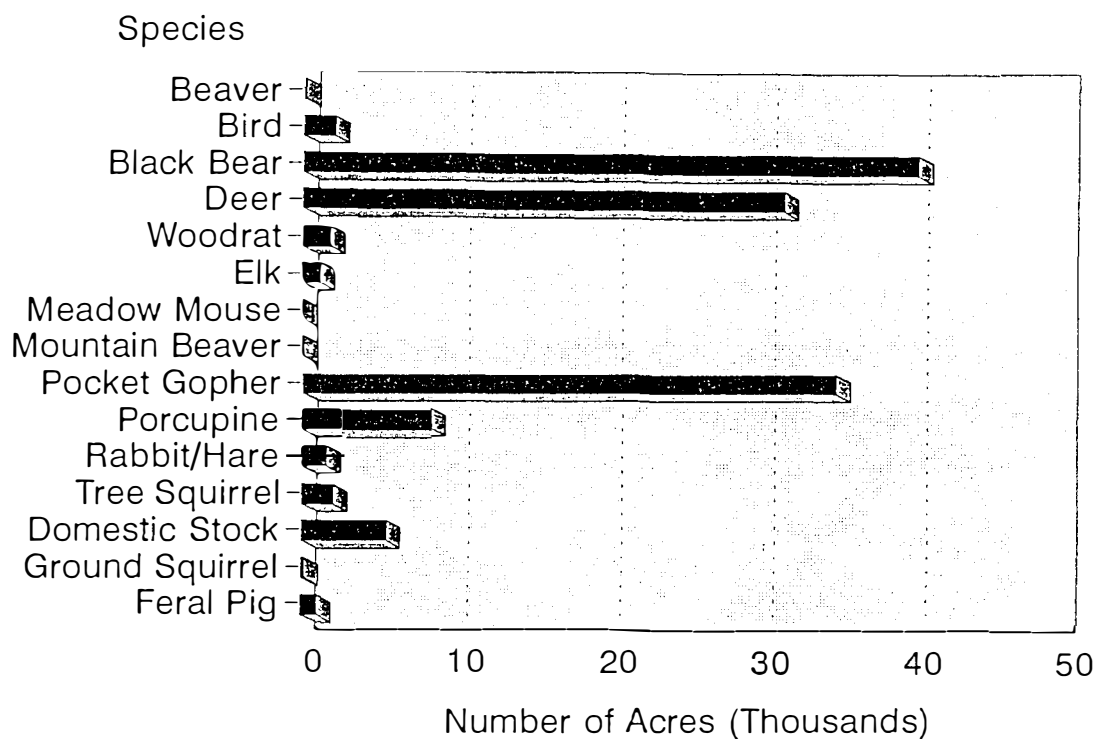
Table 8. Number of acres reported to be actively receiving some level of damage.

Species	USFS	CDF	Private	Other	Total
Beaver	62	0	0	0	62
Birds	2,000	*	0	0	,2000
Black Bear	305	*	40,000	0	40,305
Deer	19,514	10	11,960	20	31,504
Wood Rat	0	0	1,750	0	1,7502
Elk	120	0	1,000	0	1,120
Meadow mice	1	0	0	0	1
Mountain Beaver	50	0	0	0	50
Pocket gopher	33,869	0	1,077	0	34,946
Porcupine	8,093	*	400	0	8,493
Rabbits and hares	1,559	10	0	0	1,569
Tree squirrels	2,000	*	0	*	2,000
Domestic stock	3,975	0	570	1,000	5,545
Feral Pigs	0	0	0	1,000	1,000
Gound spuirrels	0	0	150	0	150
Total	71,548	20	56,907	2,020	130,495
(%)	(55)	(-)	(44)	(1)	(100)
* Incidence of damage reported but no acreages provided.					

Species Causing Damage



Acres Damaged



SPECIES ACCOUNTS

BEAVER



Species Damaged: Aspen and all conifers.

Damage Trend: Static to increasing.

Control Methods: None (2/2).

Damage Location: Nevada, Placer, Plumas, Riverside, San Bernardino, and Sierra Counties

Comments: Damage reported to poles and smaller trees in streamside zones.

BIRDS



Species Damaged: Sugar pine seed, Monterey pine, grand fir.

Damage Trend: Static.

Control Methods: Shade lath and netting (2/3), none (1/3).

Damage Location: Humboldt, Lassen, Mendocino, Modoc, Santa Cruz, and Siskiyou Counties.

Comments: Damage reported to seed in the Ben Lomond and Humboldt Nurseries. Birds were able to get through breaks in the protective netting at Ben Lomond Nursery. Sapsuckers damaged a few Monterey pine and grand fir in Mendocino County.

BEAR



Species Damaged: Douglas-fir, redwood, ponderosa pine, red fir, white fir and Sitka spruce.

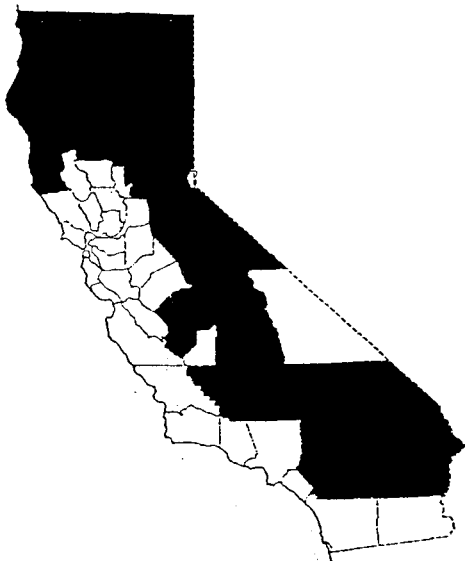
Damage Trend: Static to increasing.

Control Methods: Sport hunting (1/ 5), none (4/5).

Damage Location: Del Norte, Humboldt, Fresno, Madera, Mariposa, and Trinity Counties.

Comments: While damage was reported in both plantations and natural stands to trees of all ages, trees from 10 to 40 years old were most commonly damaged. Levels of damage vary from 1 to 40 trees/acre. Black bears are primarily a problem on private timber lands on the north coast of California, however a few incidences of bear damage were reported from the southern Sierra Nevada.

DEER



Species Damaged: Douglas-fir, redwood, ponderosa pine, Jeffrey pine, white fir, red fir, incense cedar, Port Orford cedar.

Damage Trend: Static.

Control Methods: Seedling protectors (16/22), repellents (5/22), planting larger stock (1/22), and none (7/22).

Damage Location: Alpine, Amador, Butte, Calaveras, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Kern, Lassen, Madera, Mariposa, Mendocino, Modoc, Mono, Nevada, Placer, Plumas, Riverside, San Bernardino, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, Tuolumne, and Yuba Counties.

Comments: Most damage occurs to seedlings 1-5 years old in plantations. Levels of damage reported varied from 10 to 350 trees/acre. Seedling protectors include plastic mesh tubes, bud caps, and plastic mesh netting.

WOODRAT



Species Damaged: Douglas-fir, white fir.

Damage Trend: Static.

Control Methods: Netting (1/2), none (1/2).

Damage Location: Amador, Butte, El Dorado, Humboldt, Lassen, Modoc, Nevada, Placer, Plumas, Sierra, Siskiyou, Shasta, Tehama, Trinity, and Yuba Counties.

Comments: Damage occurred to trees 1 to 25 years old at levels of 1 to 200 trees/acre in plantations. Woodrat damage is primarily reported from forests on the north coast of California. Generally considered a minor problem.

ELK



Species Damaged: Douglas-fir, white fir, redwood, incense cedar.

Damage Trend: Decreasing.

Control Methods: None (2/2).

Damage Location: Humboldt and Siskiyou Counties.

Comments: Damage occurs to seedlings and saplings 1 to 10 years of age at levels of 1 to 25 trees/acre.

MEADOW MOUSE



Species Damaged: Douglas-fir.

Damage Trend: Increasing.

Control Methods: None (1/1).

Damage Location: Humboldt County.

Comments: Girdling damage occurring on about 250 thousand 1-1 seedlings in the Forest Service Humboldt Nursery.

MOUNTAIN BEAVER



Species Damaged: Douglas-fir.

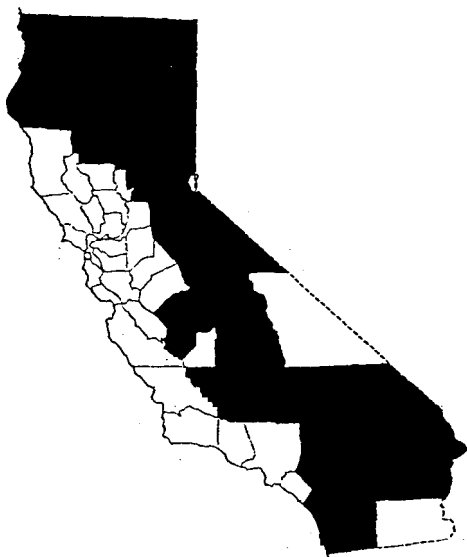
Damage Trend: Static.

Control Methods: None (1/1).

Damage Location: Del Norte, Humboldt, Siskiyou, and Trinity Counties.

Comments: Damage occurs in plantations to seedlings 2-10 years old at levels of about 2 trees/acre.

POCKET GOPHER



Species Damaged: Douglas-fir, white fir, red fir, ponderosa pine, Jeffrey pine, Coulter pine, sugar pine, lodgepole pine, giant sequoia,

Damage Trend: Static to increasing.

Control Methods: Strychnine bait (10/20), trapping (2/20), none (8/20).

Damage Location: Alpine, Amador, Butte, Calaveras, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Kern, Lassen, Madera, Mariposa, Modoc, Mono, Nevada, Placer, Plumas, Riverside, San Bernardino, San Diego, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, Tuolumne, and Yuba Counties.

Comments: Most damage to seedlings in plantations 1 to 10 years old. Levels of damage reported range from 1 to 350 trees/acre. This is the number one vertebrate pest on National Forest lands in terms of both acres with damage and number of respondents. Damage also reported to interplanted seedlings, seed orchards, and progeny test sites.

PORCUPINES



Species Damaged: Douglas-fir, white fir, red fir, ponderosa pine, Jeffrey pine, and lodgepole pine.

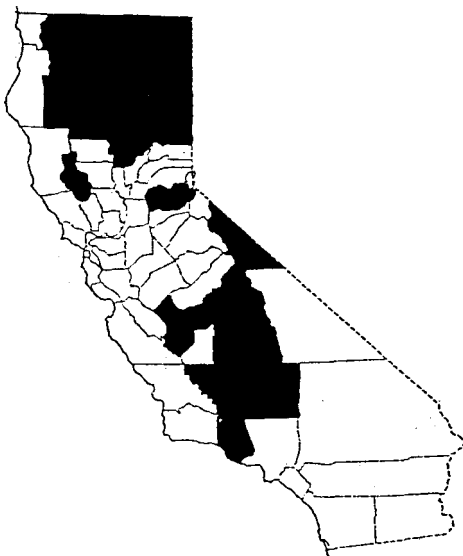
Damage Trend: Static.

Control Methods: Hunting (1/11), seedling protectors (1/11), none (9/11).

Damage Location: Alpine, Amador, Butte, Calaveras, El Dorado, Fresno, Humboldt, Lassen, Madera, Mariposa, Modoc, Mono, Nevada, Placer, Plumas, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tuolumne, and Yuba Counties.

Comments: Seedlings to mature trees reported damaged in plantations and natural stands at levels of damage ranging from 1 to 50 trees/acre.

RABBIT & HARE



Species Damaged: Douglas-fir, white fir, ponderosa pine, Jeffrey pine, lodgepole pine, western white pine.

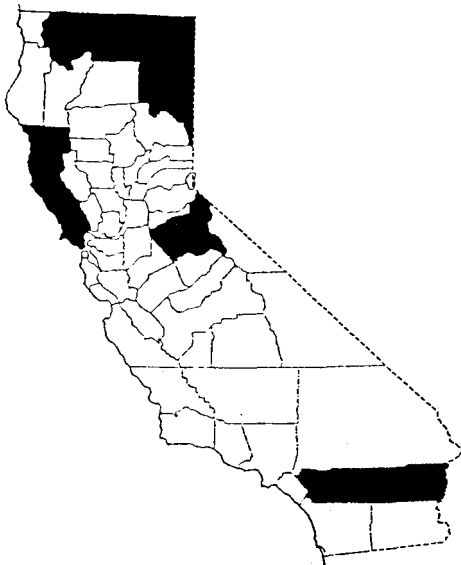
Damage Trend: Static.

Control Methods: Seedling protectors (3/9), none (6/9).

Damage Location: Butte, El Dorado, Fresno, Kern, Lake, Lassen, Modoc, Mono, Plumas, Shasta, Siskiyou, Tehama, Trinity, Tulare, and Ventura Counties.

Comments: Damage reported to seedlings 1 to 5 years old in plantations at levels of 1 to 200 trees/acre.

TREE SQUIRREL



Species Damaged: Redwood, ponderosa pine, Jeffrey pine, and sugar pine.

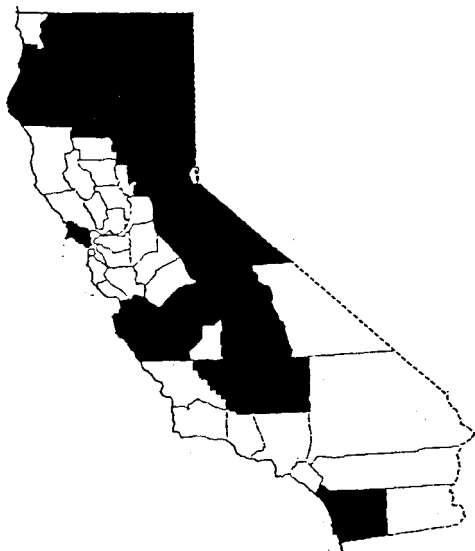
Damage Trend: Static to increasing.

Control Methods: Metal bands (1/5), none (4/5).

Damage Location: Alpine, Calaveras, Lassen, Marin, Mendocino, Modoc, Riverside, Siskiyou, Sonoma, and Tuolumne Counties.

Comments: Damage is generally to seed and cones in mature trees, especially rust resistant sugar pine. However, two reports were of bark stripping and top kill in redwood saplings.

DOMESTIC STOCK



Species Damaged: Douglas-fir, white fir, red fir, redwood, ponderosa pine, Jeffrey pine, lodgepole pine, sugar pine, western white pine, giant sequoia, and oaks.

Damage Trend: Static.

Control Methods: Placement of salt (1/15), seedling protectors (4/15), grazing restrictions (1/15), none (10/15).

Damage Location: Alpine, Amador, Butte, Calaveras, El Dorado, Fresno, Humboldt, Kern, Lassen, Madera, Marin, Mariposa, Modoc, Mono, Monterey, Nevada, Placer, Plumas, San Benito, San Diego, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, Tuolumne, and Yuba Counties.

Comments: Most respondents reported damage to seedlings and saplings 1-10 years old in plantations. Levels of damage varied from 1 to 300 trees/acre. Some reported damage to riparian and oak woodlands. One respondent reported both sheep and cows causing injuries and indicated that cows primarily cause injury by trampling and laying on seedlings.

GROUND SQUIRREL



Species Damaged: Red and white fir.

Damage Trend: Static.

Control Methods: None (1/1).

Damage Location: Nevada County.

Comments: Damage is occurring to seedlings 1 to 5 years old in seed tree units at levels of about 200 seedlings/acre.

FERAL PIG



Species Damaged: Oak species.

Damage Trend: Static to increasing.

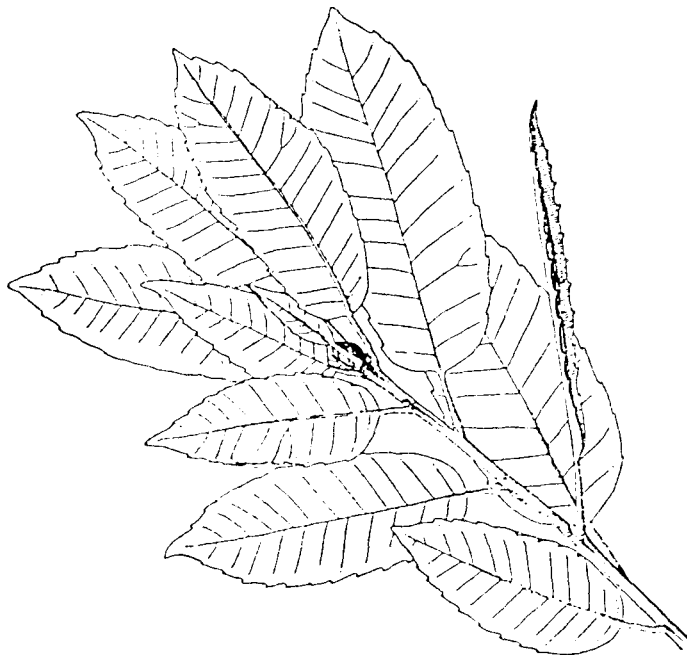
Control Methods: None (1/1).

Damage Location: Monterey and San Benito Counties (Pinnacles National Monument).

Comments: Consumption of mast and physical destruction of seedlings especially of California live oak.

STATUS AND CONTROL OF WEEDS

A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL FROM THE WEED COMMITTEE



DAVID BAKKE, CHAIR
BOB RYNEARSON, SECRETARY

STATUS AND CONTROL OF WEEDS

Herbicides were used on Forest Service lands in California primarily to release young plantations from brush and grass competition and secondarily for site preparation, wildlife habitat improvement, and general weed control (Table 9). According to the Region 5, 1993 Pesticide Use Summary, 15,281 acres of Forest Service lands in California were treated with herbicides in 1993.

Table 9. Acres of national forest lands in Region 5 treated with herbicides in 1993.

Herbicide	Acres Treated
Glyphosate	6,188
Triclopyr	1,634
Glyphosate/Triclopyr	1,065
Hexazinone	6,394
Total	15,281

Private timberland owners continue to use herbicides. The Environmental Protection Agency reports that 42,576 acres of private forest land were treated in 1992 (Table 10). Figures for 1993 are not yet available.

Table 10. Acres of private forest land treated with herbicides in 1992.

Herbicide	Acres Treated
Atrazine	1,844
2,4-D	4,247
Glyphosate	9,017
Hexazinone	9,598
Triclopyr	17,870
Total	42,576

SURVEYS AND EVALUATIONS

**A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL
FROM THE INSECT AND DISEASE COMMITTEES**

SURVEYS AND EVALUATIONS

DEMONSTRATION THINNING PLOTS IN THE EASTSIDE PINE TYPE ON THE LASSEN NATIONAL FOREST.

In 1978-1979 the Forest Service established plots in the eastside pine type to show the effects of thinning on pest-caused tree losses in areas of high tree mortality. The stands chosen were mostly pole-size ponderosa pine mixed with some white fir and incense-cedar, growing on medium to low sites, and ranging in age from 70 to 90 years. Within the demonstration plots, four levels of stocking density -- 40, 55, 70, and 100 percent of normal basal area -- were established to demonstrate the biological and economic alternatives available for management planning (Table 11). (Normal basal area is the basal area that a stand should have when fully stocked with trees, which, in the demonstration areas, ranges from 185 to 215 sq ft/ac depending on site quality.) Fourteen years after thinning, the treatments

had reduced mortality from 90 to 100 percent of the level in unthinned stands.

BLACK STAIN ROOT DISEASE IN DOUGLAS-FIR PLANTATIONS.

During 1993, The Orleans Ranger District (Six Rivers NF) and Happy Camp Ranger District (Klamath NF) were surveyed for the occurrence of black stain root disease in their Douglas-fir plantations. All traversable roads and trails that bordered or ran through plantations with Douglas-fir were surveyed. When infected trees were identified the survey moved on to the next plantation. A total of 37,509 acres of plantations on the two Districts were surveyed in this manner. On the Orleans RD, a subsample of twenty infected plantations was intensively sampled to obtain information on incidence of the disease within a plantation. Fifteen of these plantations with roadside infections also had infection in the body of the plantation.

Table 11. Commercial tree mortality by stocking level, fourteen years after thinning ^a.

Year	Residual Stocking After Thinning ^b			
	40%	55%	70%	100%
	Trees per Acre			
1980	0.0	0.2	0.2	2.4
1981	0.0	0.0	0.7	2.4
1982	0.0	0.5	0.3	3.6
1983	0.0	0.1	0.8	4.1
1984	0.0	0.0	0.0	1.0
1985	0.0	0.2	0.0	0.6
1986	0.0	0.0	0.0	1.3
1987	0.0	0.0	0.0	1.4
1988	0.0	0.0	0.0	0.0
1989	0.0	0.4	0.0	2.6
1990	0.0	0.0	0.0	2.6
1991	0.0	0.0	0.0	1.8
1992	0.0	0.2	0.0	3.0
1993	0.0	0.2	0.3	5.2
Mean	0.0	0.1	0.2	2.3
Range	0	0-0.5	0-0.8	0-5.2

Percent Mortality Reduction Compared with Normal Basal Area

100	95.7	91.3	---
-----	------	------	-----

a. Commercial trees are 8 inches dbh and larger, with straight boles, yielding a 10-foot log with a 6-inch top. Trees were killed by mountain pine beetle.

b. Percent of normal basal area.

STATE FOREST MORTALITY SURVEYS

Boggs Mountain Demonstration State Forest (BMDSF), Lake Co. All roads and some of the trails on BMDSF were surveyed for dead and dying trees in August, 1993. The observable mortality from roads and trails doesn't include all mortality on the Forest, but should reflect the current balance of pest problems. The 231 dead and dying trees included: 185 ponderosa pine, 35 Douglas fir, 9 sugar pine, and 2 incense cedar. Other than primary pests associated with dead and dying trees, other agents may be involved in either predisposing or directly killing trees. Some of the dead or dying ponderosa pines may have Ips attacks above sampling level. Yet other trees may have undetectable levels of root disease predisposing them to bark beetle attack. Bark beetle killed trees with relatively full crowns were not sampled for root disease, whereas thin crowned, beetle-attacked trees were inspected for root disease. For instance, *Heterobasidion annosum* conks were found in a few pine stumps around suspect, thin crowned trees. Table 12 lists the detected pests associated with the dead and dying trees.

Soquel Demonstration State Forest (SDSF), Santa Cruz Co. A survey similar to the one at Boggs Mountain (above) was conducted on SDSF in June, 1993. In addition to surveying from the one road passing

through SDSF, much of the Forest could be viewed and inspected for dead and dying trees with binoculars from the opposite slopes to the north. Suspect trees could then be ground checked referencing their position from various draws or trails. Table 13 lists the limited number of pests associated with the detectable dead or dying trees.

Jackson Demonstration State Forest (JDSF), Mendocino Co. A detection survey for dead and dying trees

was conducted on JDSF throughout the summer of 1993. A majority of the roads were surveyed to obtain a representation of the types of trees killed and mortality agents involved. In all, 499 dead or dying trees were counted including the following tree species: 456 Douglas fir, 37 grand fir, 4 western hemlock, 1 redwood, and 1 Monterey cypress. Table 14 lists the pests associated with the 499 dead and dying trees.

Table 12. Pests associated with dead and dying trees at Boggs Mountain Demonstration State Forest - 1993.				
Pest	Ponderosa Pine	Sugar Pine	Douglas-fir	Incense Cedar
Diseases				
Annosus root disease	1	4	-	-
Armillaria root disease	3	1	5	-
<i>Phellinus pini</i>	1		1	-
<i>Phaeolus schweinitzii</i>	-	1	-	-
<i>Resinicium (Odontia) sp.</i>	1	-	-	-
DF Black stain root disease	-	-	23	-
Insects				
Mountain pine beetle	-	1	-	-
Western pine beetle + red turpentine + flatheads	182	-	-	-
<i>Ips</i> spp.	3	-	-	-
Flatheads on SP	-	4	-	-
Weevils	-	1	1	-
Flatheaded fir borer	-	-	7	-
Borers in IC	-	-	-	2

Table 13. Pests associated with dead and dying trees at Soquel Demonstration State Forest - 1993.				
Pest	Douglas-fir	Tanoak	Pacific madrone	Coast Redwood
Diseases				
Black stain root disease	2	-	-	-
Armillaria root disease	1	-	-	-
Madrone canker	-	-	few	-
<i>Daldinia</i> sp.	-	2	-	-
Insects				
Douglas-fir beetle	1	-	-	-
Flatheaded fir borer	2	-	-	-
Western oak bark beetle	-	2	-	-
Animal Damage				
Rodent girdling/top-kill	-	-	-	2

Table 14. Pests associated with dead or dying trees at Jackson Demonstration State Forest - 1993.

Pest	Douglas- fir	Grand fir	Western hemlock	Monterey cypress	Coast Redwood
Disease					
Annosus root disease	1	12	-	-	-
Armillaria root disease	11	18	4	1	1
Black stain root disease	426	-	-	-	-
<i>Phaeolus schweinitzii</i>	1	-	-	-	-
<i>Phellinus pini</i>	5	1	-	-	-
Insects					
DF beetle	14	-	-	-	-
DF engraver beetle	5	-	-	-	-
DF pole beetle	2	-	-	-	-
<i>Dryocetes autographus</i>	1	-	-	-	-
Fir engraver beetle	-	23	-	-	-
Flatheaded fir borer	79	-	-	-	-
GF flatheads	-	4	-	-	-
Lion beetle	-	1	-	-	-
RW bark beetle	-	-	-	-	1
Silver fir beetle	6	-	2	-	-
<i>Xylotrechus longitarsus</i>	2	-	-	-	-
Animal Damage					
Rodent girdling/top-kill	-	-	-	-	112

Protocol for GIS Data Collection: Black Stain Root Disease, Blister Rust, and Annosus Root Disease. Forest Pest Detection Report R5-3400-1 (Rev. 2/82). Rev 3/90 has Elevation as #16, remaining blocks are moved back one number. Include elevation under #21 when using older forms.

We are developing a database that will be used with GIS (Geographical Information System) to identify locations in California where certain diseases are present. At this time we are asking for location and site information on BLACK STAIN ROOT DISEASE, WHITE PINE BLISTER RUST, and ANNOSUS ROOT DISEASE. Other diseases may be added to this list as their need and data accumulates. Fill in as much information as possible for completeness of our records. Your interest and help is greatly appreciated.

Protocol for data collection is based on the USDA-Forest Service Forest Pest Detection Report R5-3400-1 Rev 2/82 or later. These forms are available from CDF and the Forest Service. A reproducible copy of this form is located near the back of the annual Forest Pest Conditions in California report of the California Forest Pest Council.

Printouts of user need locations of the data base will be made available w/o cost upon request.

Call or mail/fax FPDR form to any of the following:

Jack Marshall
CDF-Resource Management
776 South State St., Suite 107
Ukiah, CA 95482
(707) 462-0506 (707) 463-1993 (FAX)

Gregg DeNitto
USDA-Forest Service, FPM
2400 Washington Ave.,
Redding, CA 96001
(916) 246-5101 (916) 246-5045 (FAX)

Jesse Rios
CDF-Resource Management
PO Box 94246
Sacramento, CA 94244-2460
(916) 653-9476 (916) 653-8957 (FAX)

Laura Merrill
USDA-Forest Service, FPM
1824 South Commercenter Circle
San Bernadino, CA 92408
(909) 383-5588 (909) 383-5770 (FAX)

Don Owen
CDF-Resource Management
6105 Airport Rd.
Redding, CA 96002
(916) 224-2445 (916) 224-2469 (FAX)

John Kliejunas
USDA-Forest Service, FPM
630 Sansome Street,
San Francisco, CA 94111
(415) 705-2571 (415) 705-2836 (FAX)

John Pronose
USDA-Forest Service, Stanislaus NF
19777 Greenley Road
Sonora, CA 95370
(209) 532-3671 ext 242
(209) 533-1890 (FAX)

David Adams
CDF-LAMRC
PO Box 1590
Davis, CA 95617
(916) 322-0126 (916) 323-0448 (FAX)

Item	Field Information	Space Allotment ¹
1.	County:	16
2.	Forest (use name of property, i.e., Sierra NF; Jones Lumber Co., etc)	22
3.	District (if on NF land):	10
4.	Legal Description: M/T/R/S/QS	22
5.	Date (m/d/y):	8
6.	Location: on road #, nearest road junction, etc.	27
7.	Land Ownership (name of land owner):	7
8.	Disease: BSRD, BR, etc.	3
9.	Size(s) of Tree(s) Affected: saplings, poles, mature, over mature.	check off
10.	Part(s) of Tree(s) Affected:	check off
11.	Species Affected:	10
12.	Number Affected:	na
13.	Acres Affected:	5
14.	Injury Distribution:	check off
15.	Status of Injury:	check off
16.	Plantation:	check off
17.	Stand Composition (Species):	9
18.	Stand Age and Size Class: saplings, poles, mature, over mature	9
19.	Stand Density (Basal Area):	na
20.	Site Quality: on a scale of 4 (1 high, 4 very poor).	9
21.	Remarks: use to add other information as soil class, aspect, slope, elevation.	as needed
22.	Sample Forwarded ?:	as needed
23.	Action Requested:	as needed
24.	Reporter's Name: first name initial plus last name.	15
25.	Reporter's Agency:	5
26.	Reporter's Address, etc.:	as needed
27.	Response: (since this form will not be returned to you, continue #21 here as necessary.)	as needed
28.	Report Number: (for your records as needed)	4
29.	Date:	as needed
30.	Examiner's Signature:	na
31.	File No.	na

¹ Keep Item length, including spaces, to no longer than Space Allotment given.

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION (See instructions on reverse)

1. COUNTY:		2. FOREST (FS ONLY):		3. DISTRICT (FS ONLY):	
4. LEGAL DESCRIPTION: T. _____ R. _____ S. _____		6. LOCATION:		7. LAND OWNERSHIP:	
5. DATE:				1. FOREST SERVICE <input type="checkbox"/> 2. OTHER FEDERAL <input type="checkbox"/> 3. STATE <input type="checkbox"/> 4. PRIVATE <input type="checkbox"/>	
8. SUSPECTED CAUSE(S) OF INJURY:		9. SIZE(S) OF TREE(S) AFFECTED:		10. PART(S) OF TREE(S) AFFECTED:	
1. INSECT <input type="checkbox"/> 5. CHEMICAL <input type="checkbox"/> 2. DISEASE <input type="checkbox"/> 6. MECHANICAL <input type="checkbox"/> 3. ANIMAL <input type="checkbox"/> 7. WEED <input type="checkbox"/> 4. WEATHER <input type="checkbox"/> 8. UNKNOWN <input type="checkbox"/>		1. SEEDLING <input type="checkbox"/> 4. SAWTIMBER <input type="checkbox"/> 2. SAPLING <input type="checkbox"/> 5. OVERMATURE <input type="checkbox"/> 3. POLE <input type="checkbox"/>		1. ROOT <input type="checkbox"/> 5. TWIG <input type="checkbox"/> 2. BRANCH <input type="checkbox"/> 6. FOLIAGE <input type="checkbox"/> 3. LEADER <input type="checkbox"/> 7. BUD <input type="checkbox"/> 4. BOLE <input type="checkbox"/> 8. CONE <input type="checkbox"/>	
11. SPECIES AFFECTED:		12. NUMBER AFFECTED:		13. ACRES AFFECTED:	
14. INJURY DISTRIBUTION:				15. STATUS OF INJURY:	
1. SCATTERED <input type="checkbox"/> 2. GROUPED <input type="checkbox"/>				1. DECREASING <input type="checkbox"/> 2. STATIC <input type="checkbox"/> 3. INCREASING <input type="checkbox"/>	
16. PLANTATION ?		17. STAND COMPOSITION (SPECIES):		18. STAND AGE AND SIZE CLASS:	
1. YES <input type="checkbox"/> 2. NO <input type="checkbox"/>		19. STAND DENSITY (BASAL AREA):		20. SITE QUALITY:	
21. PEST NAMES (IF KNOWN), AND REMARKS (SYMPTOMS AND CONTRIBUTING FACTORS):					
22. SAMPLE FORWARDED ?		23. ACTION REQUESTED:		24. REPORTER'S NAME:	
1. YES <input type="checkbox"/> 2. NO <input type="checkbox"/>		1. YOUR INFORMATION ONLY <input type="checkbox"/> 2. LAB IDENTIFICATION <input type="checkbox"/> 3. FIELD EVALUATION <input type="checkbox"/>		25. REPORTER'S AGENCY:	
26. REPORTER'S ADDRESS, ZIP CODE, & PHONE NO.:					

II. REPLY (Pest Management Use)

27. RESPONSE:			31. FILE NO.
28. REPORT NUMBER:	29. DATE:	30. EXAMINER'S SIGNATURE:	

THE COOPERATIVE FOREST PEST DETECTION SURVEY is sponsored by the California Forest Pest Control Action Council. The Pest Action Council encourages Federal, State, and private land managers and individuals to contribute to the Survey by submitting pest injury reports and samples in the following manner.

FEDERAL PERSONNEL. Send all detection reports through channels, and mail injury samples with a copy of this report to:

USDA, FOREST SERVICE, Forest Pest Management
630 Sansome Street, San Francisco, Ca. 94111.

STATE PERSONNEL. Send all detection reports through channels, and mail injury samples with a copy of this report to:

CALIFORNIA DEPARTMENT OF FORESTRY
1416-9th Street, Sacramento, Ca. 95814.

PRIVATE LAND MANAGERS AND INDIVIDUALS. Send all detection reports and samples to:

CALIFORNIA DEPARTMENT OF FORESTRY
1416-9th Street, Sacramento, Ca. 95814.

COMPLETING THE DETECTION REPORT FORM.

HEADING (BLOCKS 1-7). Enter all information requested. In Block 6, LOCATION, note distinguishing landmarks and place names so that the injury center can be relocated. If possible, attach a location map to this form.

INJURY DESCRIPTION (BLOCKS 8-15). Check as many boxes as are applicable, and fill in the requested information as completely as possible.

STAND DESCRIPTION (BLOCKS 16-20). This information will aid the examiner in determining how the stand conditions contributed to the pest problem. In Block 17, indicate the major tree species in the overstory and understory. In Block 18, indicate the stand age in years, and/or the size class (seedling-sapling; pole; young sawtimber; mature sawtimber; overmature, or decadent).

PEST NAMES (BLOCK 21). Write a detailed description of the pest or pests, the injury symptoms, and any contributing factors.

ACTION REQUESTED (BLOCK 23). Mark "Field Evaluation" only if you consider the injury serious enough to warrant a professional evaluation. Mark "Your Information Only" if you are reporting a condition that does not require further attention. All reports will be acknowledged and questions answered on the lower part of this form.

REPLY (SECTION II). Make no entries in this block; for examining personnel only. A copy of this report will be returned to you with the information requested.

HANDLING SAMPLES.

Please submit injury samples with each detection report. If possible, send several specimens illustrating the stages of injury and decline. Keep samples cool and ship them immediately after collection. Send them in a screw-top mailing tube or other sturdy container, and enclose a completed copy of the detection report.

YOUR PARTICIPATION IN THE COOPERATIVE FOREST PEST DETECTION SURVEY IS GREATLY NEEDED AND APPRECIATED. Additional copies of this form are available from the Forest Service, Forest Pest Management, and from the California Department of Forestry.

**CALIFORNIA FOREST PEST COUNCIL
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Council Vice-Chair: Dave Burns (RPF – Sacramento)

Council Secretary: Susan Frankel (USDA Forest Service – San Francisco)

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The Executive Committee is composed of the Council Chair, Vice-Chair, Council Secretary, the Standing Committee Chairs (6), and the following members-at-large (3) :

- Jim Adams (Arcata Redwood – Arcata)
- George Ferrell (USDA FS PSW – Redding)
- Andrew Storer (University of California– Berkeley)